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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample is included. (AG)

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Development of USES Aptitude Test Battery

for

Inspector

(dental equip.) 712.887

Inspector, Plastic

(dental equip.) 712.687

T: 002 024

U.S. DEPARTMENT OF LABOR
MANPOWER ADMINISTRATION

ED 068543

Technical Report on Development of USES Aptitude Test Battery

For . . .

Inspector (dental equip.) 712.887
Inspector, Plastic (dental equip.) 712.687

S-412

(Developed in Cooperation with the
Pennsylvania State Employment Service)

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March 1968

FOREWORD

The United States Employment Service General Aptitude Test Battery (GATB) was first published in 1947. Since that time the GATB has been included in a continuing program of research to validate the tests against success in many different occupations. Because of its extensive research base the GATB has come to be recognized as the best validated multiple aptitude test battery in existence for use in vocational guidance.

The GATB consists of 12 tests which measure 9 aptitudes: General Learning Ability, Verbal Aptitude, Numerical Aptitude, Spatial Aptitude, Form Perception, Clerical Perception, Motor Coordination, Finger Dexterity, and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, with a standard deviation of 20.

Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, in combination, predict job performance. For any given occupation, cutting scores are set only for those aptitudes which contribute to the prediction of performance of the job duties of the experimental sample. It is important to recognize that another job might have the same job title but the job content might not be similar. The GATB norms described in this report are appropriate for use only for jobs with content similar to that shown in the job description included in this report.

Charles E. Odell

Charles E. Odell, Director
U. S. Employment Service

GATB Study # 2699

DEVELOPMENT OF USES APTITUDE TEST BATTERY

For

Inspector (dental equip.) 712.887-018

Inspector, Plastic (dental equip.) 712.687-016

This report describes research undertaken for the purpose of developing General Aptitude Test Battery (GATB) norms for the occupations of Inspector (dental equip.) 712.887-018 and Inspector, Plastic (dental equip.) 712.687-016. The following norms were established:

GATB Aptitudes	Minimum Acceptable GATB Scores
S - Spatial Aptitude	75
P - Form Perception	85
K - Motor Coordination	90

RESEARCH SUMMARY

Sample:

55 (48 female and 7 male) workers employed as Inspectors in Pennsylvania.

Criterion:

Supervisory ratings

Design:

Concurrent (test and criterion data were collected at approximately the same time.)

Minimum aptitude requirements were determined on the basis of a job analysis and statistical analyses of aptitude mean scores, standard deviations, aptitude-criterion correlations and selective efficiencies.

Concurrent Validity

Phi Coefficient = .52 (P/2 less than .0005)

Effectiveness of Norms

Only 64% of the nontest-selected workers used for this study were good workers; if the workers had been test-selected with the S-412 norms, 83% would have been good workers. Thirty-six percent of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with the S-412 norms, only 17% would have been poor workers. The effectiveness of the norms is shown graphically in Table 1:

TABLE 1

Effectiveness of Norms

	Without Tests	With Tests
Good Workers	64%	83%
Poor Workers	36%	17%

SAMPLE DESCRIPTION

Size :

N = 55

Occupational Status :

Employed workers

Work Setting :

Workers were employed at the Dentist's Supply Company of New York, York, Pennsylvania

Employer Selection Requirements :

Education: None

Previous Experience: None

Tests: None

Other: Interview

Principal Activities :

The job duties of each worker are comparable to those shown in the job descriptions in the Appendix.

Minimum Experience

All workers in the sample had at least four months total job experience.

TABLE 2

Means, Standard Deviations (SD), Ranges and Biserial Correlations with the Criterion (r_{bis}) for Age, Education and Experience

	Mean	SD	Range	r_{bis}
Age (years)	42.1	10.5	20 - 63	- .155
Education (years)	10.2	1.7	7 - 12	.142
Experience (months)	155.1	117.6	4 -360	- .109

EXPERIMENTAL TEST BATTERY

All 12 tests of the GATB, B-1002B, were administered during November 1966.

CRITERION

The criterion data consisted of supervisory ratings of job proficiency made at approximately the same time as test data were collected. The supervisors rated workers into one of two categories, good or poor.

Reliability:

Since only one rating was obtained, no measure of criterion reliability is available.

Criterion Dichotomy:

The criterion distribution was dichotomized into high and low groups by placing 36% of the sample in the low group to correspond with the percentage of workers considered unsatisfactory or marginal. Workers in the high criterion group were designated as "good workers" and those in the low group as "poor workers."

APTITUDES CONSIDERED FOR INCLUSION IN THE NORMS

Aptitudes were selected for tryout in the norms on the basis of a qualitative analysis of job duties involved and a statistical analysis of test and criterion data. Aptitudes P, Q and K which do not have a high correlation with the criterion were considered for inclusion in the norms because the qualitative analysis indicated that these aptitudes were important for the job duties and the sample had a relatively high mean for these aptitudes and a relatively low standard deviation for aptitude Q. With employed workers, a relatively low standard deviation indicates that some pre-selection may have taken place and the resulting restricted range of scores will depress the correlation between the aptitude and the criterion. A relatively high mean score with employed workers may also indicate some sample pre-selection. Tables 3, 4 and 5 show the results of the qualitative and statistical analyses.

TABLE 3

Qualitative Analysis
(Based on the job analysis, the aptitudes indicated appear to be important to the work performed)

Aptitude	Rationale
G - General Learning Ability	Uses judgment in inspection of false teeth.
P - Form Perception	Inspects teeth for defects such as shade, enamel, porosity.
Q - Clerical Perception	Checks work ticket against the sets of teeth to be sure it is filled out correctly.

TABLE 3 (cont'd.)

K - Motor Coordination	Necessary for rapid removal and replacement of defective teeth.
M - Manual Dexterity	Uses hand scraper or tooth brush to remove any surface blemishes from the teeth in order to prevent breaking sets.

TABLE 4

Means, Standard Deviations (SD), Range and Biserial Correlations with the Criterion (r_{bis}) for the Aptitudes of the GATB

Aptitude	Mean	SD	Range	r_{bis}
G - General Learning Ability	92.2	12.5	62 - 120	.508*
V - Verbal Aptitude	92.4	10.8	72 - 127	.344*
N - Numerical Aptitude	95.2	14.8	55 - 132	.314
S - Spatial Aptitude	92.5	17.5	61 - 137	.459*
P - Form Perception	105.3	15.8	61 - 142	.181
Q - Clerical Perception	106.3	13.2	78 - 148	.199
K - Motor Coordination	104.5	15.4	74 - 146	.193
F - Finger Dexterity	97.6	17.5	47 - 136	.279
M - Manual Dexterity	103.5	20.8	40 - 147	.130

*Significant

TABLE 5

Summary of Qualitative and Quantitative Data

Type of Evidence	Aptitudes								
	G	V	N	S	P	Q	K	F	M
Job Analysis Data									
Important	X				X	X	X		X
Irrelevant		O							
Relatively High Mean					X	X	X		
Relatively Low Standard Dev.	X	X	X			X			
Significant Correlation with Criterion	X	X		X					
Aptitudes to be Considered for Trial Norms	G			S	P	Q	K		

DERIVATION AND VALIDITY OF NORMS

Final norms were derived on the basis of a comparison of the degree to which trial norms consisting of various combinations of aptitudes G, S, P, Q, and K at trial cutting scores were able to differentiate between the 64% of the sample considered good workers and the 36% of the sample considered poor workers. Trial cutting scores at five point intervals approximately one standard deviation below the mean are tried because this will eliminate about one-third of the sample with three-aptitude norms. For two-aptitude trial norms, minimum cutting scores slightly more than one standard deviation below the mean will eliminate about one-third of the sample; for four aptitude trial norms, cutting scores slightly less than one standard deviation below the mean will eliminate about one-third of the sample. The Phi Coefficient was used as a basis for comparing trial norms. The optimum differentiation for the occupations of Inspector, 712.887-018 and Inspector, Plastic 712.687-016 was provided by norms of S-75, P-85, and K-90. The validity of these norms is shown in Table 6 and is indicated by a Phi Coefficient of .52 (statistically significant at the .0005 level).

TABLE 6

Concurrent Validity of Test Norms
S-75, P-85, K-90

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	5	30	35
Poor Workers	14	6	20
Total	19	36	55

Phi Coefficient = .52 Chi Square (X^2_y) = 15.1
Significance Level = P/2 less than .0005

DETERMINATION OF OCCUPATIONAL APTITUDE PATTERN

The data for this study did not meet the requirements for incorporating the occupation studied into any of the 36 OAP's included in Section II of the Manual for the General Aptitude Test Battery. The data for this sample will be considered for future groupings in the development of new occupational aptitude patterns.

FACT SHEET

Job Title:

Inspector (dental equip.) 712.887-018

Work Performed:

Inspects slides of teeth for defects such as shade, enamel, porosity, cracks, decals, stain, coils, specks, blisters, moulding, burning, burning finish and miscellaneous after they have been burned. Each slide contains an average of 250 teeth and is inspected by very close visual attention and all defective teeth are removed to prevent them from being processed. All rejected teeth are removed from slides, recorded on work ticket according to defect and kept separate in order to salvage precious metal coils.

Carries work to work station. Brushes dust off slides when required.

Job Title:

Inspector, Plastic (dental equip.) 712.687-016

Work Performed:

Inspects plastic teeth after they have been carded. Must recognize any variation in the form of the teeth. Distinguishes readily between lefts, rights, uppers and lowers. Visually inspects sets of teeth to be sure they are mounted on the correct casings according to mould and shade.

Uses a scraper or tooth brush to remove any surface blemishes from the teeth in order to prevent breaking sets if possible. If tooth cannot be salvaged, it must be removed from the card. May replace rejects with teeth from broken sets at the work station.

Checks the work ticket against the sets to be sure it is filled out correctly. Carries work to and from the work station.

Effectiveness of Norms:

Only 64% of the nontest-selected workers used for this study were good workers; if the workers had been test-selected with S-412 norms, 83% would have been good workers 36% of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with S-412 norms, only 17% would have been poor workers.

Applicability of S-412 Norms:

The aptitude test battery is applicable to jobs which include a majority of the job duties described above.

GPO 861-067

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